

Amendments to the Drawings:

No amendments are made to the Drawings herein.

REMARKS

Claims 1-12 and 14-17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Smith et al. (U.S. Patent No. 4,635,761) in view of Giering et al. (U.S. Patent No. 5,520,267) and in view of Antony et al. Applicant respectfully asks the Examiner to reconsider these rejections in view of the below Remarks.

The present invention is directed to a modular disc brake, preferably for a heavy road vehicle. The modular disc brake includes a frame, a house and a cover. A brake mechanism forming a single pre-mounted unit is received in the house. The modules are held together by means of pull rods and nuts. The house is received in a recess of the frame. The cover covers the end of the house. As disclosed, the modular elements of the caliper (i.e., the frame, house and cover) are preferably designed so as to allow for ready access to the brake mechanism and such that machining of the calliper is less cumbersome than in known designs in that no deep recesses need to be machined. All claims have been previously amended to require a very specific configuration which allows these objectives to be achieved.

More specifically, all claims have been amended to require, among other elements, (i) that the frame include a recess having a bottom, the bottom of the recess having a plurality of openings therein adapted to allow a plurality of thrust units to pass therethrough, (ii) that the house comprises a bottom, the bottom having a plurality of through openings therein adapted to allow the plurality of thrust units to pass therethrough, and (iii) that the house be disposed within the recess such that the plurality of through openings in the bottom of the house are aligned with the plurality of openings in the bottom of the recess such that the plurality of thrust units pass through the bottom of the house and the bottom of the

recess. Applicant respectfully submits that Smith et al. does not disclose, teach or suggest at least these limitations.

The very specific configuration of the modular disc brake required by all claims, as amended, provides a brake which is simple in design as well as simple to assemble. The service brake mechanism is disposed within a "cup-shaped" house (i.e., one having a bottom, as claimed). The "cup-shaped" house is disposed within a recess. Corresponding and aligned openings are provided through the bottoms of the house and the recess to allow a plurality of thrust units of the service brake mechanism to pass therethrough. A cover closes the open end of the "cup-shaped" house. This design provides numerous advantages over all known prior art designs, including Smith et al.

Smith et al. does not disclose, teach or suggest a house having a bottom with a plurality of through openings therein. Even reading Smith et al. as suggested by the Examiner, the "bottom" of the house simply comprises the end of the side wall of element 30. It cannot be said that the "bottom" of the house has a plurality of through openings therein, as is required by all claims. Moreover, Smith et al. does not disclose, teach or suggest a frame having a recess comprising a bottom with a plurality of openings therein. Even reading Smith et al. as suggested by the Examiner, the "bottom" of the recess simply comprises shoulder formed within a hole formed in element 12. It cannot be said that the "bottom" of the recess has a plurality of openings therein, as is required by all claims.

It should be noted that the above differences between Smith et al. and the present invention are substantial, and that because of these differences, Smith et al. suffers from many of the same disadvantages as other known prior art designs. For example, the calliper of Smith et al. (and specifically the calliper housing 12

thereof) would require the machining of a deep "recess" (i.e., a hole passing all the way therethrough). Moreover, the design of Smith et al. does not allow for ready access to the brake mechanism, but rather would require complete disassembly to gain such access.

Moreover, Applicant respectfully submits that it would not have been obvious to modify Smith et al. to arrive at the present invention as claimed. It is well settled that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination or modification. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). It is also well settled that if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

In the present case, Applicant respectfully submits that not only would it not have been obvious to have made the combination suggested by the Examiner in the outstanding Office Action, but also that one skilled in the art would understand that the modifications to Smith et al. suggested by the Examiner would actually be disadvantageous.

In the Final Office Action dated July 5, 2006, the Examiner states: "It is noted that Smith et al. teach a mechanically actuated brake, which forms the basis of the rejection. The fluid actuation aspect of Smith et al. is not relevant to the rejection." Applicant respectfully disagrees.

Smith et al. is directed to a piston-type, hydraulically actuated service brake actuator, with a mechanically actuated parking brake integrated therewith. More specifically, the brake includes a caliper housing 12 having a bore 14 with a piston 16 therein. The brakes are applied during service braking by fluid being pumped under pressure into the bore 32 defined between the piston 16 and the bore 14 forcing the piston 16 to slide within bore 14 to cause the friction pad 18 to engage the rotor 20. What the Examiner refers to as the “thrust unit” 26 is actually a friction pad wear compensation mechanism, while the housing 30 comprises part of parking cartridge 28. Parking cartridge 28 acts on the hydraulically actuated piston and operates by mechanically forcing piston 16 to slide within bore 14 to cause the friction pad 18 to engage the rotor 20 without pressurized fluid being pumped into the bore 32.

The Examiner recognizes that Smith et al. fails to disclose, teach or suggest the use of a plurality of thrust units, each passing through its own opening in both the house and the frame. However, the Examiner asserts that “[i]t would have been obvious to one of ordinary skill in the art to have provided the disc brake apparatus of Smith et al. with a plurality of thrust units in place of just one thrust unit as taught by Giering et al, thus providing a more even distribution of force over the circumferential length of the friction pad.” Applicant respectfully disagrees.

It should be recognized that Giering et al. (as is Antony et al. and the present invention) is directed to a mechanical (not a piston-type) actuator which employs thrust units rather than a piston to actuate the brake. Thus, the motivation for the Examiner’s suggested combination (i.e., to provide a more even distribution of force over the circumferential length of the friction pad) is completely inapplicable to Smith et al. The “thrust rod” 26 and the parking cartridge 28 of Smith et al. are acting on a piston which slides within a bore. As is well known,

when dealing with exerting mechanical forces on a piston, it is desirable that only one force be applied, with that force being applied precisely on the center of the piston. Providing two “thrust rods” 26 or two parking cartridges 28 acting on the piston 16 would not distribute the forces any more evenly on the friction pad, since the piston would still simply be sliding within the bore. Moreover, as is also understood by those skilled in the art, when dealing with exerting mechanical forces on a piston, it is undesirable to have more than one force being applied. This is true because having two or more forces applied to a piston, if those forces are at all unequal, may cause the piston to cant within its bore, thereby causing the piston to lock within the bore and/or causing the piston and/or the bore to become excessively worn.

Therefore, Applicant respectfully submits that one skilled in the art, even when considering all three of the cited references together, would not have modified Smith et al. to replace the one centrally applied mechanical force on the piston with two or more separate mechanical forces. Not only would doing so provide substantially no advantage (do to the nature the piston-type actuator disclosed in Smith et al.), but doing so would likely render the prior art invention being modified unsatisfactory (or at least less satisfactory) for its intended purpose.


The mechanically actuated parking brake aspect of Smith et al. can not be divorced from the piston-type, hydraulically actuated service brake actuator aspect of Smith et al. without completely redesigning Smith et al. Moreover, Applicant respectfully submits that trying to ignore the fact that Smith et al. is a piston-type actuator (and that the parking brake acts via the piston) by merely stating that “[t]he fluid actuation aspect of Smith et al. is not relevant to the rejection” is improper, since it is well-settled that a prior art reference must be considered in its

entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). It is undeniable that Smith et al. discloses a piston-type actuator, and that the parking brake of Smith et al. acts via the piston. Moreover, as is discussed more fully above, it is well known in the art, when dealing with exerting mechanical forces on a piston (is does the device disclosed in Smith et al.), that it is undesirable to have more than one force being applied. As such, when Smith et al. is taken as a whole (as it must be), one skilled in the art would clearly be taught away from making the modifications suggested by the Examiner.

For the foregoing reasons, Applicant respectfully submits that all pending claims, namely Claims 1-12 and 14-17, are patentable over the references of record, and earnestly solicits allowance of the same.

Respectfully submitted,

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Wesley W. Whitmyer, Jr., Reg. No. 33,558
Todd M. Oberdick, Reg. No. 44,268
ST. ONGE STEWARD JOHNSTON & REENS LLC
986 Bedford Street
Stamford, Connecticut 06905-5619
(203) 324-6155
Attorneys for Applicant